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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/891,730	06/25/2001	Steven Verhaverbeke	004990	1392

32588 7590 10/27/2004

APPLIED MATERIALS, INC.  
2881 SCOTT BLVD. M/S 2061  
SANTA CLARA, CA 95050

EXAMINER

UMEZ ERONINI, LYNETTE T

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 10/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/891,730

Applicant(s)

VERHAVERBEKE ET AL.

Examiner

Lynette T. Umez-Eronini

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 22 July 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1,3,4,6-13,15-23,41-53,56-96,102,104,106,109,110 and 112 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1,3,4,6-13,15-23,41-51,59-96,100,102,104,106,109,110 and 112 is/are allowed.
- 6) ☒ Claim(s) 52,53 and 56-58 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 3/8/04 & 7/27/04.
- ☒ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Continued Prosecution Application*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on July 22, 2004 has been entered.

2. The previous rejection of claims 1-13, 15-23, and 104; 106 and 108-110; and 67-78 is withdrawn. Applicants have shown the formerly cited references either individually or in combination fail to teach render obvious, respectively:

exposing said wafer to a solution comprising:  $\text{NH}_4\text{OH}$ ;  $\text{H}_2\text{O}_2$ ;  $\text{H}_2\text{O}$ ; and a chelating agent comprising ethylenediaminediortho-hydroxyphenylacetic acid (EDDHA), wherein said wafer is exposed to said solution for a time in the approximate range of 30 seconds and 90 seconds while spinning said wafer and applying acoustic waves to said wafer (page 17 of Remarks);

cleaning said wafer with a solution comprising:  $\text{NH}_4\text{OH}$  and desferrioxamine B. (page 18 of Remarks); and

dispensing an HF solution on said wafer for between 2-3 seconds to etch approximately 0.5 Å to 5 Å of a thermal oxide on said wafer (page 20 of Remarks).

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 52, 53, and 56-58 are rejected under 35 U.S.C. 102(b) as being anticipated by Naoaki et al. (JP 10-171375).

Naoaki teaches removing contaminants from a silicon wafer by washing the wafer with washing solution that was prepared by removing air in pure water by degassing treatment and dissolving oxygen in the pure water (Abstract, SOLUTION), which reads on,

A method of rinsing a wafer comprising:

degassing H<sub>2</sub>O;

dissolving a gaseous oxidant comprising O<sub>2</sub> or O<sub>3</sub> into said H<sub>2</sub>O; and

supplying said rinse to said wafer within a single wafer cleaning tool.

Naoaki differs in failing to teach dissolving  $O_2$  or  $O_3$  to form a rinse at a point of use of said rinse and applying said rinse to said wafer to oxidize  $Cu^+$  on said wafer, in **claim 52**.

Since Naoaki uses the same steps in processing water as those claimed by the applicants, then it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to use Naoaki's method of processing water in the same manner as the claimed invention, which would result the same in dissolving  $O_2$  or  $O_3$  in  $H_2O$  to form a rinse at a point of use of said rinse and applying said rinse to said wafer within a single wafer cleaning tool to oxidize  $Cu^+$  on said wafer.

#### ***Allowable Subject Matter***

6. Claims 1, 3, 4, 6-13, and 15-23; 41-51; 59-66; 67-78; 79; 80-82; 83; 84-85; 86-87; 88-96; 100; 102; 104; 106, 109, and 110; and 112 are allowed.

7. The following is an examiner's statement of reasons for allowance:

As to claims 1, 3, 4, 6-13, and 15-23, the prior art of record taken alone or in combination fails to suggest, teach or render obvious a method of processing a wafer comprising: exposing a wafer to a solution comprising ethylenediaminediorthohydroxyphenylacetic acid (EDDHA) along with  $NH_4OH$ ,  $H_2O_2$ , and  $H_2O$ , wherein said wafer is exposed to said solution in an approximate range of 30 and 90 seconds while spinning and applying acoustic waves to said wafer, in combination with the rest of the limitations of said claims;

As to claims 41-51, 59-66, 79-96, and 100; the prior art of record taken alone or in combination fails to suggest, teach or render obvious the sequence of steps in a method cleaning a wafer, in combination with the rest of the limitations of the said claims;

As to claims 67-78, the prior art of record taken alone or in combination, fails to suggest, teach, or render obvious a method of processing a wafer comprising the step of after placing a wafer in a single wafer cleaning tool, dispensing an HF solution on said wafer for 2-3 seconds to etch approximately 0.5  $\mu$  - 5  $\mu$  of a thermal oxide on said wafer, along with the rest of the limitations of the said claims; and

As to claims 102; 104; 106, 109, and 110; and 112, the prior art of record, taken either alone or in combination, fails to disclose or render obvious a method of cleaning a wafer, respectively with N,N'-Bis(2-hydroxyphenyl)ethylenediiminodiacetic acid (HPED); triethylenetranitriohexazecetic acid (TTHA); desferri-ferrrioxamin B.; and molybdic acid, in combination with the rest of the limitations of the above claims.

### ***Response to Arguments***

8. Applicants' arguments with respect to claims 52, 53, and 56-58 have been considered but are moot in view of the new ground(s) of rejection. Applicants amended said claims to recite a method of rinsing a wafer, which is not disclosed by the formerly applied references.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 571-272-1470. The examiner is normally unavailable on the First Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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September 27, 2004

**NADINE G. NORTON**  
**SUPERVISORY PATENT EXAMINER**

